



Bit Error Rate Testing

This feature module describes how to configure a bit error rate test (BERT) and display the test results for channelized line cards in Cisco internet routers.

History for the Bit Error Rate Testing Feature

Release	Modification
12.0(14)S	This feature was introduced with six-port Channelized T3 line cards in Cisco 12000 series Internet routers.
12.0(17)S 12.0(17)ST	This feature was introduced with two-port Channelized OC-3/STM-1 line cards in Cisco 12000 series Internet routers.
12.0(21)S 12.0(21)ST	This feature was introduced with four-port Channelized OC-12/STM-4 line cards in Cisco 12000 series Internet routers.
12.0(21)S	BERT pattern enhancements were added on six-port Channelized T3 line cards in Cisco 12000 series Internet routers.
12.2(28)SB	This feature was integrated into Cisco IOS Release 12.2(28)SB.
12.0(33)S	This feature was integrated into Cisco IOS Release 12.0(33)S.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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Feature Overview

Bit error rate test (BERT) circuitry is built into channelized line cards in Cisco internet routers and is supported on the following line cards:

- One-port Channelized OC-12 (DS3)
- One-port Channelized OC-12/STM-4 (OC-3/STM-1)
- One-port Channelized OC-48/STM-16 (DS3/E3, OC-3c/STM-1c, OC-12c/STM-4c) POS/SDH ISE
- Two-port Channelized OC-3/STM-1 (2-Port CHOC-3 DS1/E1)
- Four-port Channelized OC-12/STM-4 (DS3/E3, OC-3c/STM-1c) POS/SDH ISE
- Six-port Channelized T3 (T1)

Performing a BER Test

Bit error rate (BER) test allow you to test cables and diagnose signal problems in the field. You can configure individual T1 channel groups to run an independent BER test. You set one local serial port to Bit error rate test (BERT) mode while the remaining local serial ports continue to transmit and receive normal traffic. The BER test checks communication between the local and the remote ports.

When running a BER test, your system expects to receive the same pattern that it is transmitting. If traffic is not being transmitted or received, create a back-to-back loopback BER test on the link or in the network, and send out a predictable stream to ensure that you receive the same data that was transmitted.

To determine if the remote serial port returns the BERT pattern unchanged, you must manually enable network loopback at the remote serial port while you configure a BERT pattern to use in the test at specified time intervals on the local serial port.

You can later display and analyze the total number of error bits transmitted and the total number of bits received on the link. You can retrieve error statistics anytime during the BER test.

BERT Patterns Supported

Two categories of test patterns can be generated by the onboard BER test circuitry: pseudo-random and repetitive. Pseudo-random test patterns are exponential numbers and conform to the Consultative Committee on International Telephony and Telegraphy/International Telecommunications Union (CCITT/ITU) O.151 and O.153 specifications.

[Table 1](#) describes the test patterns supported on channelized line cards in Cisco 12000 series Internet routers.

Table 1 *BERT Patterns Supported in Cisco 12000 Series Internet Routers*

BERT Pattern	Description
0's	Test pattern consisting of all 0's that is used to test line coding
1's	Test pattern consisting of all 1's that is used to test alternating line volt and repeaters
2 ¹¹	Pseudo-random repeating test pattern that consists of 2,048 bits
2 ¹⁵	Pseudo-random repeating test pattern that consists of 32,767 bits
2 ²⁰ QRSS	Pseudo-random repeating test pattern that consists of 1,048,575 bits

BERT Pattern	Description
2 ²³	Pseudo-random repeating pattern that is 8,388,607 bits long. This pattern is only available for an E3 interface.
Unframed-2 ¹⁵	Pseudo-random repeating pattern that is 32,767 bits long. The DS-3/E3 framing bits in the DS-3/E3 frame are overwritten when the pattern is inserted into the frame.
Unframed-2 ²⁰	Pseudo-random repeating pattern that is 1,048,575 bits long. The DS-3 framing bit in the DS-3 frame is overwritten when the pattern is inserted in the DS-3 frame.
Unframed-2 ²³	Pseudo-random repeating pattern that is 8,388,607 bits long. The E3 framing bit in the E3 frame is overwritten when the pattern is inserted into the frame. This pattern is only available for an E3 interface.
Alt 0's and 1's	Test pattern consisting of alternating 0's and 1's that is used to test the preamp and equalizer
1 in 8	0x80 test pattern used to test the timing recovery
User-defined	A user-defined test pattern consisting of 8, 16, 24, or 32 bits in a 1- to 4-octet field. The bit transmission order is from least significant bit (LSB) to most significant bit (MSB). For example, the bit pattern 0x010203 is transmitted as the byte sequence 0xC04080.

Benefits

Additional BERT Patterns Supported

Additional BERT patterns are now supported on channelized line cards in Cisco internet routers to allow you to test more thoroughly for bit errors on a T1 link and diagnose signal problems.

Restrictions

Only One T1/E1 BER Test Supported Per T3 Port

Only one BER test circuit is supported on the T1/E1 links configured for a T3 port.

T3 Links Not Supported

BER tests are not supported on a T3 link.

Two-Port Channelized OC-3/STM-1 Line Cards

When you perform BER tests on the DS1/E1 interface of a two-port channelized OC-3/STM-1 line card, the following restrictions apply:

- 2²³ BER test patterns are not supported.
- User-defined BER test patterns are not supported.

Four-Port Channelized OC-12/STM-4 Line Cards

When you perform BER tests on the DS3/E3 interface of a four-port channelized OC-12/STM-4 line card, the following restrictions apply:

- 2¹¹ BER test patterns are not supported.
- User-defined BER test patterns are not supported.

Six-Port Channelized T3 Line Cards

When you perform BER tests on the T1 interface of a six-port channelized T3 line card, the following restrictions apply:

- 2²³ BER test patterns are not supported.
- BER tests on a T1 link are supported only in framed mode.

Related Features and Technologies

- Wide area networks (WANs)

Related Documents

- *Cisco IOS Release 12.0 Configuration Fundamentals Configuration Guide*
- *Cisco IOS Release 12.0 Configuration Fundamentals Command Reference*
- *2-Port STM-1/OC-3 Channelized E1/T1 Line Card Installation and Configuration*
- *4-Port Channelized OC-12/STM-4 POS/SDH ISE Line Card Installation and Configuration*
- *6CT3-SMB Line Card Installation and Configuration*
- ITU O.151

Configuration Tasks

This section describes how to configure and perform a BER test on a T1 line or a DS3 interface on a channelized line card, and how to stop or verify the test:

- [Performing a BER Test on a T1 Line, page 5](#) (Required)
- [Terminating a BER Test on a T1 Line, page 5](#) (Required)
- [Verifying a BER Test on a T1 Line, page 5](#) (Optional)
- [Performing a BER Test on a DS3/E3 Interface, page 6](#) (Required)
- [Terminating a BER Test on a DS3/E3 Interface, page 6](#) (Required)
- [Verifying a BER Test on a DS3/E3 Interface, page 6](#) (Optional)

Performing a BER Test on a T1 Line

	Command	Purpose
Step 1	Router# configure terminal	Enters global configuration mode.
Step 2	Router(config)# controller T3 slot/port	Selects the interface.
Step 3	Router(config-controller)# t1 line-number loopback local	Sets the specified T1 line into local loopback mode.
Step 4	Router(config-controller)# t1 line-number bert pattern pattern interval time	Sends a BERT pattern through the T1 line for the specified time interval.

Terminating a BER Test on a T1 Line

Command	Purpose
Router(config-controller)# no t1 line-number bert interval time	Terminates the BER test running on the specified T1 line.

Verifying a BER Test on a T1 Line

To verify that a BER test is running on a T1 line, enter the show controllers t3 slot/port:t1-line-number command at any time during the test.

```
Router# show controllers t3 6/0:1
```

```
T3 6/0 is up. Hardware is GSR 6 port CT3
```

```
T1 1 is up
```

```
timeslots: 1-24
```

```
FDL per AT&T 54016 spec.
```

```
No alarms detected.
```

```
Framing is ESF, Clock Source is Internal
```

```
BERT test result (running)
```

```
Test Pattern : 2^11, Status : Sync, Sync Detected : 1
```

```
Interval : 5 minute(s), Time Remain : 5 minute(s)
```

```
Bit Errors (since BERT started): 6 bits,
```

```
Bits Received (since BERT started): 8113 Kbits
```

```
Bit Errors (since last sync): 6 bits
```

```
Bits Received (since last sync): 8113 Kbits
```

Performing a BER Test on a DS3/E3 Interface

	Command	Purpose
Step 1	Router# configure terminal	Enters global configuration mode.
Step 2	Router(config)# interface serial <i>slot/port:line-number</i>	Selects the interface.
Step 3	Router(config-controller)# bert pattern pattern interval time	Sends a BERT pattern through the interface for the specified time interval.

Terminating a BER Test on a DS3/E3 Interface

	Command	Purpose
Step 1	Router# configure terminal	Enters global configuration mode.
Step 2	Router(config)# interface serial <i>slot/port:sts1-number</i> or Router(config)# interface serial <i>slot/port:au3-number</i> or Router(config)# interface serial <i>slot/port:au4-number:vc3-number</i>	Selects the DS3/E3 interface according to the type of framing configured: - SONET framing - SDH framing with AU-3 mapping - SDH framing with AU-4 mapping.
Step 3	Router(config-controller)# no bert	Terminates the BER test running on the specified interface.

Verifying a BER Test on a DS3/E3 Interface

To verify that a BER test is running on a DS3 interface, enter one of the following commands at any time during the test:

- For SONET framing:
show controllers sonet slot/port:sts1-number bert
- For SDH framing with AU-3 mapping:
show controllers sonet slot/port:au3-number bert
- For SDH framing with AU-4 mapping:
show controllers sonet slot/port:au4-number:vc3-number bert

The following example shows how to verify a BER test on a DS3 interface with SONET framing or SDH framing with AU-3 mapping:

```
Router# show controllers sonet 5/0:2 bert
```

```
Interface Serial5/0:2 (DS3 channel 2)
BERT information:
  State           :enabled (sync'd)
  Pattern          :2^15
  Interval         :3 minute
  Time remaining  :00:00:30
```

```
Total errors      :5
Time this sync    :00:02:30
Errors this sync  :5
Sync count        :1
```

Monitoring and Maintaining BER Tests

To monitor a BER test on a channelized line card, use the following EXEC commands:

Command	Purpose
Router# show controllers t3 <i>slot/port:t1-line-number</i>	Displays complete or partial results of the BER test on a T1 line.
Router# show controllers sonet <i>slot/port:sts1-number</i>	Displays results of the BER test on a DS-3/E3 interface with SONET framing.
Router# show controllers sonet <i>slot/port:au3-number</i>	Displays results of the BER test on a DS-3/E3 interface with SDH framing with AU-3 mapping.
Router# show controllers sonet <i>slot/port:au4-number:vc3-number</i>	Displays results of the BER test on a DS-3/E3 interface with SDH framing with AU-4 mapping.

Configuration Examples

This section provides an example of how to send the BERT pseudo-random pattern of 2²⁰ through a T1 line 10 for five minutes.

```
Router(config)# controller T3 6/0
Router(config-controller)# t1 10 bert pattern 2^20 interval 5
```

Additional References

The following sections provide references related to bit error rate testing.

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
None	—

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Command Reference

This section documents modified commands only.

- [bert pattern interval](#)
- [show controllers](#)

bert pattern interval

To perform a bit error rate test using a specified test pattern on a channelized interface on a Cisco 12000 series Internet routers, use the **bert pattern interval** command in global configuration mode. To disable BER testing, use the **no** form of this command.

```
[t1 line-number] [e1 line-number] bert pattern pattern interval time

no [t1 line-number] bert pattern pattern interval time
```

Syntax Description	t1 line-number	Optional. Configures a BER test on a T1 line under SONET or SDH framing by specifying the line number. Range: 1 to 28.
	e1 line-number	Optional. Configures a BER test on an E1 line under SDH framing with AU-3 AUG mapping by specifying the line number. Range: 1 to 28.
	bert pattern pattern	Specifies the DS1 test pattern to be used in the BER test. Valid values: 0s, 1s, 2^11, 2^15, 2^20, 2^23, alt-0-1, 1-8, and a user-defined value. See Table 2 for a description of the patterns that are supported by each channelized interface.
	interval time	Specifies the duration of the BER test in minutes. Range: 1 to 14400. (14400 minutes is equal to 240 hours.)

Defaults No default behavior or values.

Command Modes Global configuration

Command History	Release	Modification
	12.0(21)S	This command was introduced.
	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines You can configure only one BER test on a T3 port. If you start more than one test, the following error message is displayed:

```
%BERT is already running on T1 t1-line-number T3 port-number. Only one T1 bert test can be running at a time.
```

The bit error rate test pattern occupies only the T1 or E1 payload bits.

You sometimes must enter a command prefix before the **bert pattern interval** command, depending on whether a T1 or E1 line uses SONET or Synchronous Digital Hierarchy (SDH) framing:

- For VT1.5 mapping into STS-1 under SONET framing, you must enter the **vtg** *vtg-number* prefix; for example:

```
Router(config)# controller sonet 6/0
Router(config-controller)# sts-1 1
Router(config-ctrlr-sts1)# vtg 4 t1 1 bert pattern 2^11 interval 5
```

- For CT3 mapping into STS-1 under SONET framing, no command prefix is necessary; for example:

```
Router(config)# controller sonet 6/0
Router(config-controller)# sts-1 1
Router(config-ctrlr-sts1)# t1 1 bert pattern 2^11 interval 5
```

- For AU-3 and AU-4 AUG mapping under SDH framing, you must enter the **tug-2** *tug-2-number* prefix; for example:

```
Router(config)# controller sonet 6/0
Router(config-controller)# framing sdh
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# mode c-12
Router(config-ctrlr-tug3)# tug-2 4 e1 1 bert pattern 2^11 interval 5
```

No command prefix is necessary when you configure a BER test on a serial E3 line or on a T1 line under Super Frame (SF) or Extended Superframe (ESF) framing.

Table 2 shows what BERT patterns are supported on each channelized line.

Table 2 *BERT Patterns Supported on Channelized Lines*

Line Type	BERT Patterns Supported
DS3 under SONET or SDH framing	2^15, 2^20, unframed-2^15, and unframed-2^20
E1 under SDH framing with AU-3 AUG mapping	2^11, 2^15, and 2^20
E3 under SDH framing	2^15, 2^20, 2^23, unframed-2^15, unframed-2^20, and unframed-2^23
T1 under SF or ESF framing	0s, 1s, 2^11, 2^15, 2^20, alt-0-1, 1-8, and user-defined patterns consisting of 8, 16, 24, or 32 bits in a 1- to 4-octet field
T1 under SONET framing	2^11, 2^15, and 2^20
T1 under SDH framing with AU-3 AUG mapping	2^11, 2^15, and 2^20

Examples

The following example shows how to run a BER test on a serial E3 line on a four-port Channelized OC-12/STM-4 line card:

```
Router# configure terminal
Router(config)# interface serial 5/0:2
Router(config-if)# bert pattern 2^15 interval 3
Router(config-if)# no bert pattern 2^15 interval 3
```

The following example shows how to run a BER test on a T1 line under SF or ESF frame formatting on a six-port Channelized T3 line card:

```
Router# configure terminal
```

```
Router(config)# controller T3 6/0
Router(config-if)# t1 bert pattern 2^20 interval 5
```

The following example shows how to run a BER test on a T1 line under SONET framing on a two-port Channelized OC-3/STM-1 line card:

```
Router# configure terminal
Router(config)# controller sonet 6/0
Router(config-controller)# sts-1 1
Router(config-ctrlr-sts1)# vtg 2 bert pattern 2^11 interval 4
```

The following example shows how to run a BER test on a T1 line under SDH framing with AU-3 AUG mapping on a two-port Channelized OC-3/STM-1 line card:

```
Router# configure terminal
Router(config)# controller sonet 6/0
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 t1 1 bert pattern 2^11 interval 4
```

The following example shows how to run a BER test on an E1 line under SDH framing with AU-4 AUG mapping on a two-port Channelized OC-3/STM-1 line card:

```
Router# configure terminal
Router(config)# controller sonet 6/0
Router(config-controller)# au-4 tug-3 2
Router(config-ctrlr-au3)# tug-2 4 e1 1 bert pattern 2^11 interval 4
```

Related Commands

Command	Description
bert errors	Inserts a specified number of errors into the BERT pattern used in the BER test in progress.

show controllers

To display the results of a bit error rate test, use the **show controllers** command in privileged EXEC mode.

```
show controllers [sonet slot/port.sts1-number/t1-number | sonet slot/port.sts1-number |
vtg-number/t1-number | sonet slot/port.au-3-number/tug-2-number/t1-number |
sonet slot/port.au-4-number/tug-3-number/tug-2-number/e1-line-number |
sonet slot/port.au-4-number/vc3-number |
sonet slot/port:interface-number | t3 slot/port:t1-line-number] [bert | brief | tabular]
```

Syntax Description

sonet slot/port.sts1-number/t1-number	Displays bit error rate test results for a T1 line under SONET framing in CT3 mode.
sonet slot/port.vtg1-number/sts1-number/t1-number	Displays BERT results for a T1 line under SONET framing in VT-15 mode.
sonet slot/port.au-3-number/tug-2-number/t1-number	Displays BERT results for a T1 line under SDH framing with AU-3 AUG mapping.
sonet slot/port.au-4-number/tug-3-number/tug-2-number/e1-line-number	Displays BERT results for an E1 line under SDH framing with AU-4 AUG mapping.
sonet slot/port.au-4-number/vc3-number	Displays BERT results for a DS-3/ E3 interface under SDH framing with AU-4 mapping.
sonet slot/port:interface-number	Displays BERT results for a DS-3/ E3 interface under SONET framing or SDH framing with AU-3 mapping.
t3 slot/port:t1-line-number	Displays BERT results for a T1 line under SF or ESF format framing.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(21)S	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines

You can enter the **show controllers** command at any time during a BER test:

- After you terminate the test by entering the **no** form of the **bert pattern interval** command.
- After the test is completed.
- During the test (in real time).

Examples

The following example shows sample output from the **show controllers** command for BERT results on a T1 line under SONET framing in VT-15 mode. (Table 3 describes the lines in the BER test portion of the output.)

```
Router# show controllers sonet 4/0.1/1/1 brief

OC3.STS1 4/0.1 is up. Hardware is GSR 2 port STM1/OC3 (channelized)
  Applique type is VT1.5 in STS-1

STS-1 1, VTG 1, T1 1 (VT1.5 1/1/1) is up
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  No alarms detected.
  Framing is ESF, Clock Source is Internal
  BERT test result (running)
    Test Pattern : 2^20-QRSS, Status : Sync, Sync Detected : 1
    Interval : 5 minute(s), Time Remain : 4 minute(s)
    Bit Errors (since BERT started): 0 bits,
    Bits Received (since BERT started): 112 Mbits
    Bit Errors (since last sync): 0 bits
    Bits Received (since last sync): 112 Mbits
```

Table 3 *show controllers sonet Line Descriptions*

Output Line	Description
BERT test result (running)	Indicates the current state of the test. In this case, “running” indicates that the test is still active. If the test is complete, “done” is displayed.
Test Pattern : 2^20-QRSS, Status : Sync, Sync Detected : 1	Indicates the test pattern you selected for the test (2^20-QRSS), the current synchronization state (Sync), and the number of times synchronization was detected during this test (1).
Interval : 5 minute(s), Time Remain : 4 minute(s)	Indicates the time allocated for the test to run and the time remaining for the test to run. For a BER test that you terminate before the time expires, this line indicates the time the test would have taken to run and the time remaining for the test to run had you not terminated it. “unable to complete” is displayed to indicate that you interrupted the test.
Bit Errors (since BERT Started): 0 bits Bits Received (since BERT start): 112 Mbits Bit Errors (since last sync): 0 bits Bits Received (since last sync): 112 Mbits	Shows the bit errors that were detected versus the total number of test bits that were received since the test started and since the last synchronization was detected.

The next example shows sample output from the **show controllers** command for BERT results on an E1 line under SDH framing with AU-4 AUG mapping.

```
Router# show controllers sonet 3/0.1/3/5

SONET 3/0 is up. (Configured for Locally Looped) Hardware is GSR 2 port
STM1/OC3 (channelized)
  Applique type is Channelized OCx interface
  Clock Source is Line, AUG mapping is AU4.
Medium info:
  Type: SDH, Line Coding: NRZ, Line Type: Short SM
```

```

Regenerator Section:
  LOF = 0          LOS = 0          BIP(B1) = 0
Multiplex Section:
  AIS = 0          RDI = 0          REI = 0          BIP(B2) = 0
Active Defects: None
Active Alarms: None
Alarm reporting enabled for: SF SLOS SLOF B1-TCA B2-TCA B3-TCA
BER thresholds:  SF = 10e-3  SD = 10e-6
TCA thresholds:  B1 = 10e-6  B2 = 10e-6  B3 = 10e-6
High Order Path:

PATH 1:
  AIS = 0          RDI = 0          REI = 15          BIP(B3) = 11
  LOP = 0          PSE = 4          NSE = 0          NEWPTR = 1
  LOM = 0          PLM = 0          UNEQ = 0
Active Defects: None

S1S0 = 02, C2 = 02

PATH TRACE BUFFER : STABLE
CRC-7: 0xF2 OK
  52 6F 75 74 65 72 33 2F 30 2F 31 00 00 00 00      Router3/0/1....

STM1.AU4 3/0.1 is up.  Hardware is GSR 2 port STM1/OC3 (channelized)
  Applique type is C12 in TUG-3 in AU-4

AU-4 1, TUG-3 1, TUG-2 1, E1 1 (C-12 1/1/1/1) is up
  timeslots: 1-31
  No alarms detected.
  Framing is crc4, Clock Source is Internal
  BERT test result (running)
    Test Pattern : 2^15, Status : Sync, Sync Detected : 1
    Interval : 5 minute(s), Time Remain : 5 minute(s)
    Bit Errors (since BERT started): 0 bits,
    Bits Received (since BERT started): 95 Mbits
    Bit Errors (since last sync): 0 bits
    Bits Received (since last sync): 95 Mbits
  Data in current interval (708 seconds elapsed):
    0 Line Code Violations, 1 Path Code Violations
    0 Slip Secs, 1 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    1 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavail Secs, 0 Stuffed Secs
  Data in Interval 1:
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavail Secs, 0 Stuffed Secs
  Data in Interval 2:
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavail Secs, 0 Stuffed Secs
  Data in Interval 3:
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 1 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    1 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavail Secs, 0 Stuffed Secs
  Total Data (last 3 15 minute intervals):
    0 Line Code Violations, 0 Path Code Violations,
    0 Slip Secs, 1 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    1 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavail Secs, 0 Stuffed Secs

```

The third example shows sample output from the **show controllers** command for BERT results on a T1 line under ESF framing:

```
Router# show controllers sonet 3/0.1/3/5

Router# show controller t3 6/0:1

T3 6/0 is up. Hardware is GSR 6 port CT3

T1 1 is up
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  No alarms detected.
  Framing is ESF, Clock Source is Internal
  BERT test result (running)
    Test Pattern : 2^11, Status : Sync, Sync Detected : 1
    Interval : 5 minute(s), Time Remain : 5 minute(s)
    Bit Errors (since BERT started): 6 bits,
    Bits Received (since BERT started): 8113 Kbits
    Bit Errors (since last sync): 6 bits
    Bits Received (since last sync): 8113 Kbits
```

Related Commands

Command	Description
show version	Displays information about the router's hardware and software configuration.

Glossary

6CT3-SMB—Product number of the 6-port channelized DS3 line card for Cisco 12000 series Internet routers that supports packet over DS1.

BERT—Bit error rate test. Bit error rate is the probability that a bit error could occur on any given bit on a line.

CLI—Cisco IOS command-line interface.

CT3—Channelized T3.

DS1—Digital Signal Level 1. A U.S. standard for high-speed data transmission over a T1 line at a data rate of 1.544 Mbts/sec.

DS3—Digital Signal Level 3. A U.S. standard for high-speed data transmission over a T3 line at a data rate of 44.736 Mbts/sec.

T1—A digital carrier facility used to transmit a DS1-formatted digital stream at 1.544 Mbps.

T3—A digital carrier facility used to transmit a DS3-formatted digital stream at 44.746 Mbps.

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